

AD-A282 532



RAND

Countering the Proliferation of Chemical Weapons

Maurice Eisenstein

DTIC
ELECTE
JUL 25 1994
S G D

National Defense Research Institute



DTIC QUALITY INSPECTED 1

94-22939



3988

94 7 21 061

The research described in this report was sponsored by the Under Secretary of Defense for Policy. The research was conducted in the National Defense Research Institute, RAND's federally funded research and development center supported by the Office of the Secretary of Defense and the Joint Staff, Contract MDA903-90-C-0004.

Library of Congress Cataloging in Publication Data

Eisenstein, Maurice, 1930-

Countering the proliferation of chemical weapons / Maurice Eisenstein ; prepared for the Under Secretary of Defense for Policy.

p. cm.

"MR-207-USDP"

Includes bibliographical references.

ISBN 0-8330-1388-2

1. Chemical weapons—United States. 2. Chemical arms control.
3. United States—Military policy. I. United States. Office of
the Under Secretary of Defense for Policy. II. RAND. III. Title.

UG447.E35 1993

358'.3482'0973—dc20

93-15939

CIP

RAND is a nonprofit institution that seeks to improve public policy through research and analysis. Publications of RAND do not necessarily reflect the opinions or policies of the sponsors of RAND research.

Published 1993 by RAND

1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138

To obtain information about RAND studies or to order documents,
call Distribution Services, (310) 393-0411, extension 6686

RAND

Countering the Proliferation of Chemical Weapons

Maurice Eisenstein

*Prepared for the
Under Secretary of Defense for Policy*

National Defense Research Institute

Accession For	
NTIS	CRA&I <input checked="" type="checkbox"/>
DTIC	TAB <input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification _____	
By _____	
Distribution /	
Availability Codes	
Dist	Avail and / or Special
A-1	

Preface

This report reviews the continuing impetus for chemical-weapon proliferation despite a wide range of measures designed to inhibit, halt, or reverse the proliferation of materials and technology for producing and employing chemical weapons. The report also describes some additional measures that could further aid in stemming chemical-weapon proliferation. The research was conducted as part of a project on chemical-weapon nonproliferation. This project involved interaction with the staffs of the Office of the Secretary of Defense, the Department of State, the Arms Control and Disarmament Agency, and the National Security Council. Additionally, the nonproliferation proposals were discussed with members of several NATO governments, industry representatives, and academics in the United States and abroad.

Some of the nonproliferation measures proposed by the project have been implemented in whole or in part. They include requiring a license for the export of technical know-how to build or operate chemical facilities to countries suspected of developing chemical weapons, the reaching of accords to ensure that nations in a region will agree not to pursue chemical weapons, and the establishment of a chemical-weapon ad hoc inspection activity prior to the formal establishment of one under a chemical weapon convention (CWC).

This research was conducted for the Under Secretary of Defense for Policy within the International Security and Defense Strategy Program of RAND's National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense and the Joint Staff.

Contents

Preface	iii
Summary	vii
1. INTRODUCTION	1
2. BACKGROUND	3
3. DESERT STORM: LESSONS LEARNED AND IMPLICATIONS	7
4. U.S. POLICY OBJECTIVES AND OPTIONS	11
Deny Chemical Weapons Through Export Controls	13
Deter Through Diplomatic Agreements and Treaties	15
Deny the Utility of Chemical Weapons Through Defensive Measures	18
Deter Through Threat of Retaliation: Sanctions	19
5. CONCLUSIONS	26

Summary

For more than a decade, the U.S. government has been grappling with the question of chemical-weapon proliferation along with the associated problems of missile and nuclear-weapon proliferation. The Geneva Protocol of 1925 banned the first use but not the production, transfer, or storage of chemical weapons. The extensive chemical-weapon arsenal of the former Soviet Union was the primary chemical-weapon threat to the United States from the start of the Cold War in the early 1950s, and thus drove U.S. chemical-weapon policy. The United States finally ratified the Geneva Protocol in 1975. Iraq's use of chemical weapons in its war with Iran in the 1980s stimulated the United States to improve its export controls of chemicals used to make chemical weapons. With the demise of the Soviet Union as a military threat to the United States and its European allies, and Russia's willingness to honor the 1990 U.S.-Soviet agreement to destroy their respective chemical-weapon stockpiles, U.S. policy focused on the proliferation and use of chemical weapons among third-world nations, particularly in the Middle East. Chemical weapons have occasionally been used in violation of the Geneva Protocol over the past decades, most extensively by Iraq in its war with Iran. In the past, however, U.S. policies for control of chemical-weapon proliferation had a lower priority than those for control of more threatening nuclear weapons and ballistic missiles.

The United States is not directly threatened by a chemical-weapon attack from an aggressor nation. Iraq was apparently deterred from using its chemical weapons in the recent Gulf war, possibly by the overwhelming strength of the opposing UN conventional forces. Given the ferocity of the attack by UN forces against Iraq during Operation Desert Storm, it is too early to determine whether other nations will be discouraged from seeking chemical weapons or other weapons of mass destruction.

The Chemical Weapon Convention

In the past, U.S. nonproliferation policies have relied heavily upon export controls to deny suspect states the chemicals and technology needed to produce chemical weapons. During Desert Storm, the United States supplied aircraft and ballistic missile defenses, as well as passive defenses, to protect threatened sites or to deter a chemical-weapon attack. In recent years, the U.S. Department of

Commerce has instituted stricter and more comprehensive controls on exports to countries suspected of creating their own chemical-weapon arsenals. The U.S. Congress has passed laws that impose trade sanctions against companies and countries that circumvent U.S. controls. The United States is upgrading and developing theater missile defenses that will be available for deployment later in this decade to defend against chemical-weapon and other missile attacks. The United States has also participated in negotiations at the UN Committee on Disarmament for a Chemical Weapons Convention (CWC) that would also prohibit the production and storage of chemical weapons by all member states.

The CWC will lay the ground rules for the transfer of precursor chemicals and will create an agency to perform on-site inspections to determine whether member states are in compliance with the CWC. The CWC was completed and endorsed by the UN in November 1992, was opened for signature in January 1993, and is expected to enter into force in the middle or later part of 1993 and become operational sometime in 1995 or 1996. Known and reported chemical-weapon stocks will be destroyed within 10 years, unless states seek and are given an extension. There are outstanding issues to be settled, and differences still exist among the industrial democracies, and more of them between the industrial and emerging industrial nations, making the target date for full implementation of the CWC uncertain.

The recent experience of UN inspectors sent to Iraq to implement UN Resolution 687, and the uncertainty of whether they were able to destroy all of Iraq's weapons of mass destruction and the related facilities, give credence to the proposition that verifying compliance with the CWC with a high degree of assurance will be difficult if not impossible. Chemical-weapon stocks dating from World War II, left behind by invading countries, remain in such places as China, and other large quantities of chemical-weapon stocks have been buried or, apparently, discarded at sea. It may prove impossible to locate and destroy the world's chemical-weapon stocks with any assurance. There have been recent allegations of chemical-weapon use by Croatian forces against Serbs, by Azerbaijan and Armenia against each other, and in Mozambique. As regional instabilities grow, more allegations of chemical-weapon use might be expected. Russia has claimed that all Soviet chemical-weapon stocks are on Russian soil. However, Russia continues to develop binary chemical weapons, which it claims never to have agreed to stop, and large disparities, in the thousands of tons, remain between the admitted size of the former Soviet chemical-weapon stockpile and independent estimates. Moreover, the Russians claim they are incapable of destroying their chemical-weapon stocks within 10 years without outside financial support. One must conclude that ridding the world of chemical

weapons is not a trivial matter, and militarily useful quantities may remain adjacent to regions of growing instability for years and perhaps decades to come.

When will a sufficient number of countries find the CWC adequate and in their interest to sign and ratify? Over 140 countries have cosponsored the UN General Assembly's CWC resolution. Absent from that group, however, are some of the more important nations of the Middle East, e.g., Egypt, Syria, Iraq, Saudi Arabia, and Jordan, which will not likely sign without an agreement banning nuclear weapons in the region as well.

Of concern is the prospect that some developing nations will sign the CWC with the intention of avoiding controls on export of chemicals to their countries while preparing themselves to break out rapidly from under the CWC in times of national emergency. If this were to happen, or be perceived as happening, it could lead to further chemical-weapon proliferation, or an arms race, and possibly to further regional instabilities.

Given the continuing perception that chemical weapons can deter conventional and chemical-weapon attack by an aggressor nation, and the ability of dedicated nations to produce chemical weapons, export controls and the CWC may be necessary but may not be sufficient to halt the covert proliferation of chemical weapons. It may take additional measures to effectively inhibit the further spread and potential use of chemical weapons.

Additional Measures May Be Required

One potentially important measure would be the deployment of effective theater missile and aircraft defenses to threatened nations to deter or thwart chemical-weapon attacks, particularly against population centers. The introduction of active defenses may in some instances have to be tempered to ensure that regional military balances are not unduly upset, leading to yet greater instability. Acquiring active defenses will be costly for most nations and, if not available, may tempt or induce countries to acquire their own chemical weapons to deter attacks by being prepared to retaliate in kind. The threat of using chemical weapons in retaliation may also be seen as a low-cost means of deterring conventional attacks.

Some emerging industrial nations may fear that the CWC inspection regime will be too intrusive, and controls on chemical transfers too constraining on their growing chemical industries, and therefore may not see it in their interest to sign the CWC any time soon. In any case, the CWC will not be operational for at least two or possibly three more years at the earliest, and its impact on chemical-

weapon proliferation may not be felt in some regions for many more years. Consideration might be given, therefore, to seeking temporary accords banning the production and storage of chemical weapons among countries within a region.

Five Andean nations have already done this,¹ and, for all practical purposes, this is the approach being considered for controlling weapons of mass destruction in the Middle East. The Mendoza Accord between Argentina, Brazil, and Chile also bans chemical weapons and will continue until the CWC is in place. Nations that participate in a regional accord may, however, use that as an excuse not to sign the CWC. Conversely, participating nations could agree that the regional accord will be subsumed within the CWC once it enters into force or at some fixed time in the future.

The U.S. Chemical and Biological Weapons Act of 1991 supports multilateral efforts and cooperation in stemming chemical and biological weapon (CBW) proliferation. It also mandates U.S. economic and political sanctions against domestic and foreign companies and foreign nations that use CBWs in violation of international law, or against their own nationals, or who are preparing to do these things. Sanctions include a halt to arms sales, financial assistance, and air service agreements, and downgrading diplomatic relations. Sanctions will be removed when a country allows UN inspectors to verify the cessation of its chemical-weapon activities and makes restitution to those affected by its chemical-weapon use. The act encourages international support for these sanctions. With the U.S. ratification of the CWC in the next year or so, however, it is unclear what the legal status of this act will be and whether the CWC, which contains no substantive sanctions, will take precedence. It is also uncertain whether other industrial countries would follow the U.S. example of unilaterally imposed sanctions.

UN Sanctions May Be Desirable

A more controversial and potentially effective measure would be for the UN Security Council to pass a resolution that promises the imposition of sanctions on any country found to have used illegal chemical weapons against another nation or against its own population. The UN agency being formed to verify CWC compliance can bring confirmed violations to the attention of the Security Council for its action. The type and degree of sanctions could be established in

¹Columbia, Bolivia, Ecuador, Venezuela, and Peru.

general terms by a resolution but could actually vary as functions of the casualties and damage inflicted by the use of chemical weapons and of other relevant circumstances. If convinced that chemical weapons had been used, the Security Council could, by a two-thirds vote, implement specific economic sanctions (or a total economic embargo) and/or an assortment of other political actions against that country. These sanctions would be lifted when a cease-fire agreement was reached that included at least the destruction of all weapons of mass destruction and the related facilities under UN supervision. In the extreme, the UN could sanction the use of force against an offending nation, as it did with Iraq. As an example, a country found to have used limited amounts of chemical weapons on the battlefield may have UN sanctions placed on it banning transfers of all military and military-related technology, including chemicals and other industrial products. Similar sanctions were imposed on Iraq in 1991 for its unlawful invasion of Kuwait and on Serbia for human rights violations in 1992. International transportation to and from that nation could be halted, or, if civilians were attacked with chemical weapons, all trade with the offending nation could be halted. What is important for countries to know is that costly sanctions will follow their use of chemical weapons.

Governments that have used illegal chemical weapons against their own populations may be more difficult to deal with, but that is no assurance that economic sanctions and an embargo on arms and military-related equipment will not be imposed by the UN. Moreover, it may be more difficult to establish that illegal chemical weapons have been used within a country without the cooperation of the government of that country. A UN resolution identifying sanctions for use rather than possession could be a major deterrent to the use of chemical weapons but would require the committed, long-term support and participation of the permanent members of the Security Council, as well as of the countries in the immediate region of the offending nation. It is not clear whether such a long-term policy would be favored by the permanent members of the Security Council or by the smaller nations, which may believe that this measure, as they do with the CWC, is expressly directed toward them. The threat of such sanctions may be an even greater deterrent if the five permanent Security Council members were to agree to forgo, or moderate, their right to impose a veto. Moreover, the impact of such a measure on countries that might be interested in acquiring chemical weapons will depend on UN resolve and how it reacts to Iraq's continued attempts to circumvent sanctions and to stall the UN inspections required by UN Resolution 687.

As long as political uncertainty and regional instabilities continue, the search for security will continue, and, in many instances, countries will focus on acquiring

weapons of mass destruction, including chemical weapons. The implementation of the CWC will be a necessary but not necessarily a sufficient condition in the fight to halt chemical-weapon proliferation. Only when the military and political costs of using chemical weapons are understood and judged to be too high will the impulse of many countries to acquire chemical weapons diminish.

1. Introduction

The devastating effect of chemical warfare in World War I was a major factor in the widespread acceptance of the Geneva Protocol of 1925, prohibiting the first use of lethal chemicals in international conflict. There was only occasional use of chemical weapons before World War II. Italy used chemical weapons against Ethiopia, both being parties to the Geneva Protocol, in 1936, resulting in economic sanctions being imposed by the League of Nations. The use of chemical weapons by the Japanese in China and Mongolia during the 1930s and 1940s led to war-crime convictions against Japanese officers. Egypt, which had signed the protocol in 1928, used chemical weapons against Yemen from 1962 through 1969. Yemen had not yet signed the protocol.

The U.S. government confirmed the use of mycotoxins by Vietnam against its enemies in southeast Asia between 1975 and 1983. The UN confirmed the use of chemical weapons in 1984 by Iraq in its near decade-long war with Iran that ended in 1988, and the retaliatory chemical-weapon use by Iran against Iraq. The United Nations also confirmed Iraq's use of chemical weapons against its Kurdish population in 1988, killing several thousand men, women, and children.

In the aftermath of the recent Persian Gulf war of 1990 and 1991, initiated by Iraq's invasion and conquest of Kuwait and threat to use chemical weapons, increased emphasis has been placed on finding new policies that might effectively help limit the proliferation of chemical weapons. The United States and other industrial nations have initiated new export control policies for chemicals. Since Desert Storm, a series of UN sanctions has been implemented against a defeated Iraq, including the destruction of Iraqi weapons of mass destruction and the related facilities under the observation of UN inspection forces.

This report reviews the continuing impetus for chemical-weapon proliferation despite UN sanctions to eliminate Iraqi weapons of mass destruction, new export controls on the precursor chemicals used to make lethal chemical weapons, dual-use technologies, and the know-how for producing chemical weapons, and a chemical weapons convention (CWC) that bans the use, production, and storage of chemical weapons likely to be in force within the next few years. These measures may be costly to implement, will take at least several more years to

implement, and may, or may not, succeed in eliminating chemical-weapon stocks worldwide.

Discussions of additional measures, some costly and others not, that could further aid in stemming chemical-weapon proliferation are considered, including the employment of defensive measures, passive and active, to deter chemical-weapon attack; the creation of regional accords banning chemical weapons; and the passage of a UN resolution stating the nature of sanctions to be invoked by the UN Security Council on countries proven to have used chemical weapons in violation of the Geneva Protocol of 1925.

2. Background

Since 1968, discussions have been under way in the United Nations on how to eliminate chemical weapons from the military arsenals of the world. After March 1980 formal negotiations were held within the UN's Committee on Disarmament to conclude an agreement that would outlaw the manufacture and possession of all chemical weapons.¹ In recent years the increased proliferation and use of chemical weapons have heightened international concerns leading to some new measures being implemented to stem the flow of chemicals and technology that could support the development of chemical-weapon forces, particularly among third world countries. This concern peaked during the UN war with Iraq, which had previously employed chemical weapons in its war against Iran in violation of the Geneva Protocol of 1925. In the wake of the Iraq-Iran war, the Australia Group,² comprising some 22 nations, including the United States, was formed to discuss mutual actions, primarily in the realm of export controls, that would assist in stemming the spread and growth of chemical-weapon arsenals. The member countries exchange intelligence data, and U.S. cooperation with this group, to seek multilateral controls, is fostered by the Chemical and Biological Weapons Control Act of 1991. The Group's declarations, however, are not binding on its members.

In 1990, the United States and the Soviet Union before its dissolution, and subsequently Russia, agreed first to eliminate most, and then in 1991 all of their chemical-weapons arsenals along with their chemical-weapon production and storage facilities.³ It is expected to take until at least early in the next decade to complete the destruction of some 40,000 tons of Russian chemical-weapon stocks.⁴ The accuracy of this assertion about the size of the former Soviet

¹William Tuohy, "After Decades Accords Reached on Chemical Arms Draft Treaty," *Los Angeles Times*, August 8, 1992.

²The role of the Australia Group is discussed in an undated press release titled *International Conference Against Chemical Weapons*, Canberra, Australia, September 18-22, 1989, issued by the Australian Overseas Information Service, Embassy of Australia, Washington, D.C.

³Yeltsin wrote that "All the chemical weapons of the former USSR are on the territory of Russia, and [Russia] takes responsibility for their destruction." As reported in the *Arms Control Reporter* citation of FBIS-SU, February 4, 1992, which in turn cites *Moscow Rossiyskaya Gazeta*, January 31, 1992. U.S.-USSR Chemical Weapons Destruction Agreement, June 1, 1990.

⁴Colonel Viktor Kholstov, Chief of the Department of Chemical Arms in the CIS Joint Armed Forces, indicated it was hardly feasible to eliminate Russia's chemical weapons in ten years as envisioned by the CWC because of Russia's current political, social, and economic difficulties. As reported in the *Arms Control Reporter* citation of FBIS-SU, April 20, 1992, which in turn cited Radio Moscow, April 17, 1992.

chemical-weapon arsenal has been questioned by the U.S. intelligence community, which has estimated the arsenal to be substantially larger. The U.S. chemical-weapon arsenal, estimated at 30,000 tons, will similarly be destroyed by 2002. For years it was argued that U.S. and Soviet chemical-weapon arsenals were the road blocks to a CWC banning all chemical weapons. Recently, however, an agreement on the text of a CWC was reached and was signed in January 1993 in Paris by more than 100 nations, exceeding the 65 signatory countries required for the CWC to enter into force, which is expected to occur by mid- to late 1993. Given the problems yet to be resolved, this may be optimistic.⁵ Once the CWC is in force, it is expected to take about two to three years to establish and operate an inspection regime as defined by the convention. The United States has also implemented new control measures on the export of precursor chemicals, some relevant technology, and technical know-how—the participation of U.S. citizens in the production of suspect chemicals and the construction of suspect chemical production facilities.⁶ It remains uncertain whether measures adopted by other members of the Australia Group would be effectively enforced.

Chemicals are a major export commodity for most industrialized nations and a growing export commodity for many emerging industrial nations.⁷ The chemical industry is highly competitive. It is not surprising, therefore, that some industrial and emerging third world countries are reluctant to accept a treaty that includes facility inspections for treaty verification and the possible loss of proprietary data or to accept that even less-intrusive inspections of suspect facilities could expose and jeopardize proprietary government or security information. The CWC leaves little incentive for some nations to join for the next several years, since it allows most precursor chemicals needed to produce chemical weapons to be obtained until then with an export license stipulating end use by non-CWC parties for legitimate purposes, thereby avoiding facility inspections for now.

Proliferation of chemical weapons among some third-world nations may be in response to the proliferation of weapons of mass destruction by others in their region, including chemical weapons, or as a deterrent to a conventional attack by

⁵William Tuohy, *Los Angeles Times*, August 8, 1992.

⁶1989 *Annual Foreign Policy Report to the Congress*, U.S. Department of Commerce.

⁷Since the early 1970s, many developing countries have experienced major growth in their chemical industries and chemical exports. Between 1970 and 1990, some 30 developing nations increased their chemical exports by 1,000 percent or more, according to UN-supplied data. Of special note are Brazil, Yugoslavia, Taiwan, South Korea, Tunisia, Singapore, Morocco, Malaysia, and the Bahamas, all of which experienced growth in chemical exports by over 2,000 percent since 1970. The value of these developing-country exports exceeded \$16 billion in 1989.

an aggressive neighbor. The number of nations that are believed either to possess chemical weapons or to be developing chemical weapons has been growing.⁸ Some of these same nations have also acquired ballistic missile technology with the potential for delivering chemical weapons effectively against cities or larger military targets in their region. An effective ban on the possession of chemical weapons may be difficult to reach with countries that believe their security may be at stake without them. Chemical weapons are, by comparison to nuclear weapons, easy and much less costly to acquire. Iraq was believed to have produced several thousand tons of mustard gas, smaller quantities of nerve agent, and tens of thousands of artillery shells and bombs, but had not manufactured a nuclear device before the start of Desert Storm.⁹

Nations with limited technical sophistication and financial resources, but perhaps with some foreign assistance, are expected to be able to covertly produce the more common chemical-weapon agents, such as mustard gas, at the rate of 100 to 300 tons per year, with a pilot plant-size operation requiring about 2,000 to 3,000 square feet of factory space. As an example of the problem of detecting covert activities in the aftermath of the war with Iraq, the UN inspectors who monitored the destruction of Iraq's chemical weapons remain uncertain as to whether they located all of Iraq's chemical weapons and chemical-weapon agents.¹⁰ Furthermore, even if Iraq's chemical-weapon capability were totally destroyed, it may take them far less than a year to be back in the chemical-weapon business and to employ chemical weapons in military conflicts.¹¹

In the aftermath of the war with Iraq, there is uncertainty as to whether Iraq's chemical-weapon capability served it well. The threat of chemical-weapon use by Iraq had severe psychological implications for its intended victims. But Iraq's chemical-weapon capability, which was not employed, may have been the excuse

⁸According to the *Arms Control Reporter*, nine nations admit to having chemical weapons or a capability for producing chemical weapons; 21 nations are suspected of having chemical weapons or the capability to produce chemical weapons; and nine nations have used or are suspected of using chemical weapons in the past. *Arms Control Reporter*, May 1992, pp. 704.A.3-704.A4.

⁹Elaine Sciolino, "Iraq Report Says Chemical Arsenal Survives War," *New York Times*, April 20, 1991, p. 1. At the end of Desert Storm, Iraq reported to the UN that it possessed fewer than 12,000 chemical weapons, including 30 chemical-weapon Scud missiles. Estimates of Iraq's chemical-weapon forces far exceed that report by factors of 2 to 4. See "Bombs Cut Some Mustard," *Washington Times*, January 29, 1991, p. B8.

¹⁰Based in part on a private discussion with a member of the UN chemical-weapon inspection team used in Iraq. This possibility was also noted in past RAND assessments of verifying a CWC with on-site inspection. Some of the techniques Iraq used to avoid UN inspectors were considered in a prior RAND study, as were additional means for treaty circumvention.

¹¹Once a developing country has succeeded in producing chemical weapons and retains the technical know-how to do so, it should have little difficulty in using that capability to reestablish a covert capability to produce militarily significant quantities of chemical weapons within months to a year.

or rationale, along with Iraq's nuclear and missile programs, for the UN coalition's extensive bombing of Iraq's military facilities. Would the coalition have been more likely to pursue diplomatic solutions to removing Iraqi troops from Kuwait if Iraq had not possessed and used chemical weapons in the past and were not actively seeking nuclear and biological weapons as well? The outcome of the Iraq war, therefore, may make some chemical-weapon aspirants rethink their decision, lest they at some future time feel they could similarly receive such punishment. An important question now is what we have learned and, therefore, what we could do in the aftermath of Desert Storm that would inhibit chemical-weapon proliferation globally, particularly in regions where there are important U.S. interests and where instability prevails.

3. Desert Storm: Lessons Learned and Implications

The UN-approved military actions and sanctions against Iraq in the aftermath of its invasion of Kuwait were unlike any since its actions in 1950, when it supported South Korea against North Korea's invasion below the 38th parallel. The UN coalition, led by the United States, unleashed massive bombing attacks against Iraqi forces and military facilities. These attacks focused in large measure on facilities believed to house components of Iraq's nuclear, biological, and chemical-weapon and ballistic-missile programs. Special emphasis was placed on search-and-destroy operations to eliminate Iraqi ballistic missiles used in terrorist attacks on Saudi Arabia and Israel. A complete embargo on trade with Iraq was implemented to ensure that no new military supplies would flow into Iraq and that no oil would flow out, thus placing extreme pressure on the Iraq economy.

In the terms of surrender, as given in UN Resolution 687, Iraq agreed to destroy, under UN supervision, its capability to produce nuclear, chemical, and biological weapons and ballistic missiles, as well as any of those weapons they possessed. This process continues, as does the economic and military embargo, which will be lifted when the UN inspection groups and the UN Security Council are satisfied that all the prohibited weapons and activities in Iraq are eliminated and UN Resolution 687 has been fully adhered to.

Iraq did not use its chemical-weapon artillery against UN coalition ground forces or in its missile attacks against Israel and Saudi Arabia. Iraqi chemical-weapon missiles were still under development and probably not available for use. Hussein may have been deterred, however, by the possibility that the UN coalition or Israel would have retaliated in kind or worse, with nuclear weapons. Iraq's ballistic-missile attacks against Israeli cities with the threat of chemical warheads were effective in inducing great fear among the Israeli people. Iraqi missiles caused relatively few casualties in Israel and Saudi Arabia but caused significant damage and economic losses in Israeli cities.¹ The role of the ballistic

¹Israeli losses to Iraqi missiles included 4 fatalities, about 290 injured, and almost 12,000 apartments damaged. The primary economic loss to Israel, however, came from the nearly complete halt of commercial activity in Tel Aviv for almost a month, where estimates of losses range into the hundreds of millions of dollars.

missile as an important strategic weapon in the Middle East has been established. The possibility of missiles carrying chemical-weapon warheads adds to their terror and potential strategic value. The availability of such weapons will also affect the calculations on force projection by U.S. political and military planners in the future. The military utility of chemical weapons will depend on how effective active missile defenses and passive chemical-weapon defenses are. Iraq's use of chemical weapons against defenseless Iranian forces was ultimately effective in getting Iran to agree to halting hostilities, thus demonstrating some tactical utility of chemical weapons. How militarily effective an Iraqi chemical-weapon attack against coalition forces would have been is uncertain.

The ongoing UN inspections within Iraq to locate and destroy Iraq's remaining chemical-weapon capability give clear evidence that the UN coalition bombing left many chemical weapons and the capability to produce them untouched.² This gives some indication of the success Iraq had in developing its chemical-weapon forces covertly. Moreover, the Iraqi government has deliberately lied to the UN inspection teams about the locations of significant parts of their chemical-weapon effort. Almost two years after the completion of Desert Storm, the UN inspection team remains uncertain as to how much they have accomplished in locating Iraq's chemical-weapon forces and facilities.³ Given the myriad ways that chemical weapons and agents can be hidden, it may prove impossible to ensure that all of Iraq's, or any other nation's, chemical weapons can be located by inspection teams without the cooperation of the inspected government.

Moreover, there appears to be a consensus that Iraq could covertly rebuild its chemical-weapon arsenal to a militarily significant size—at least a few hundred tons of mustard agent—within a year.⁴ There is speculation that there was a high casualty rate among chemical weapon technicians in Iraq, suggesting Iraq could continue despite such risks to regain its chemical-weapon capability in the future. On the basis of Saddam Hussein's behavior to date, and given the arms buildup in Iran, it must be assumed that Iraq will again, if not prevented, pursue the acquisition of new chemical-weapon forces once unencumbered with UN-imposed sanctions and Resolution 687.

²E. Sciolino, "Iraq Report Says Chemical Arsenal Survives," *New York Times*, April 20, 1991.

³Based on private discussions with a member of the UN chemical-weapon inspection team. Also see "Iraq's Secret Weapon," *Washington Post*, editorial, August 16, 1991.

⁴There may be evidence that this is already under way; see "Saddam Rearms," *Newsweek*, August 17, 1992, p. 4. Also Robert Gates, CIA director, has stated, "If U.N. sanctions are relaxed, we believe Iraq could produce modest quantities of chemical agents almost immediately, but it would take a year or more to recover the chemical weapons capability it previously enjoyed," *Christian Science Monitor*, January 23, 1992, p. 1.

The economic embargo imposed on Iraq in August 1990 may be becoming increasingly porous. Iraq's oil shipments to Jordan satisfy that country's requirements, and illicit trade with surrounding countries, especially Jordan, but including Turkey and Iran, allegedly continues to grow in spite of the UN-imposed sanctions.⁵ While Iraq's international trade is only a fraction of what it was before Desert Shield, and its economy has shrunk significantly, Baghdad has managed to make major repairs to its infrastructure damaged during Desert Storm. Saddam Hussein remains in place, apparently in control of an unstable Iraq, but no longer an immediate threat to the region.⁶

What is the likely effect of Desert Storm on chemical-weapon proliferation in the Middle East and elsewhere? Will nations believe that an experience similar to Iraq's awaits them if they pursue chemical weapons or other weapons of mass destruction? Are most states that have or want chemical weapons likely to see chemical weapons as a deterrent to attacks by larger or more aggressive neighbors, such as Iraq? Given the continuing erosion of the UN trade sanctions on Iraq, are nations likely to believe that the acquisition and use of chemical weapons and the potential consequences are acceptable risks? Or will the apparent cost to Iraq during and after Desert Storm be seen as potentially too high a price for them and thus deter their acquiring or using chemical weapons? These are issues nations will need to consider if they wish to pursue the deployment of chemical-weapon forces.

We cannot be certain how all nations will react to the aftermath of Desert Storm. Indeed, the ramifications of Desert Storm are still unfolding as Iraq tries to defy the intent of UN Resolution 687 and to hold onto as much weapons technology as it can. Since Desert Storm, the United States has promoted talks between Israel and its Arab neighbors to reach peace accords, including possible agreement on limited self-rule for the Palestinians in the West Bank and Gaza. Separate Arab-Israeli talks are being promoted to deal with an assortment of regional issues, including arms control, environmental, and economic issues.

What we may be able to conclude to date about the lessons of Desert Storm is that the UN Security Council, where no permanent member has invoked a veto in the past two years, now appears capable of acting to punish governments severely that are blatantly aggressive or that violate the UN Charter. Extreme

⁵There has been no overall assessment of the ongoing effectiveness of the UN economic sanctions levied against Iraq. Stories in the press abound on the continuing filtering of supplies into Iraq from Turkey, Iran, Syria, and Jordan. See John M. Goshko, "King Denies Jordan is Helping Iraq Defy Sanctions," *Washington Post*, July 22, 1992, p. 21.

⁶Melissa Healy, "Iraq's Force is Broken but Unbowed," *Los Angeles Times*, August 18, 1992.

sanctions, particularly economic sanctions, can be effective but may begin to erode over time, and ensuring that a nation is free of all weapons of mass destruction, particularly chemical weapons, may be extraordinarily difficult if not impossible. This may suggest that some policy emphasis be placed on deterring the use of chemical weapons and not just on their production and storage.

Desert Storm may have also proven that third-world countries are likely to be deterred from employing chemical weapons against U.S. forces or facilities by the threat of massive conventional-force retaliation. We cannot be certain, however, whether chemical weapons would have been used by Iraq in desperation if Baghdad were about to be overrun and occupied by coalition forces or whether it would use chemical weapons against weaker neighbors in the future.

4. U.S. Policy Objectives and Options

Prior to Desert Storm, U.S. chemical-weapon policies appeared to be driven as much by the military balance between NATO and the Warsaw Pact nations, and between the United States and the former Soviet Union, as by its concern for proliferation. U.S.-proposed policy, as announced in 1984, was for strict—anywhere, anytime—challenge inspection of suspect facilities to be included in the CWC.¹ With the demise of the Soviet Union and with domestic political outcries, the United States has backed away from such intrusive inspection requirements, based upon the concern that the risks to U.S. national security interests will outweigh the potential benefits. In the aftermath of chemical weapons use in the Iran-Iraq war, the use by Iraq against its Kurdish population, and concerns during Desert Storm, the United States has upgraded its policies for controlling the export of chemicals, technology, and technical know-how, particularly to suspect nations.² The United States has also pressured other industrial nations to expand and improve similarly their export controls of chemicals and technology to suspect nations.³ The Australia Group has also expanded its list of chemicals and technology that should be controlled.

U.S. policy after Desert Storm has focused on seeking to implement confidence-building measures among Middle East nations and to limit, and ultimately

¹George Bush, "Excerpts from Remarks by Vice President George Bush to the Conference on Disarmament, Geneva, Switzerland," press release, April 18, 1984. The U.S. proposal for challenge inspections under the CWC, as stated by Vice President Bush, would allow for the inspection of any facility, government or privately owned, that was challenged, with no right of the inspected country to refuse. This commitment to anytime, anywhere challenge inspection was seen by some as a means of forestalling the CWC and of emphasizing U.S. concerns for past Soviet noncompliance with other arms control treaties. The U.S. position has receded to allow an inspected country the right to refuse entry to nonchemical or declared chemical-weapon facilities that are challenged, but imposes upon the inspected country the requirement to assure that the CWC inspection team can adequately determine whether or not the challenged facility is covertly involved with chemical weapons. For a more expansive discussion of CWC verification, see Michael Krepon, *Verification of a Chemical Weapons Convention: A Guide to the Perplexed*, Occasional Paper #9, The Henry Stimson Center, March 1992.

²U.S. export regulations require a validated license to export some 50 dual-use chemicals that can be used as precursors for chemical weapons, as well as equipment, technical data, and software useful for the production of chemical agents, to all countries except to the 22 countries who are members of the Australia Group. The re-export of controlled U.S. chemicals will also require U.S. approval. These Bush-administration actions are part of its Enhanced Proliferation Control Initiative (EPCI), announced in December 1990. See "Proliferation Control Regulations Approach Final Form," *Export Control News*, Vol. 5, Number 2, February 5, 1991.

³For a discussion and assessment of the United States achieving multilateral adoption of its chemical-weapon export controls, see "U.S. Pushes EPCI at Australia Group Meeting," *Export Control News*, Vol. 5, No. 5, May 30, 1991.

eliminate, weapons of mass destruction in the region. The likelihood of success in halting or eliminating chemical weapons and chemical-weapon activities in the Middle East must be judged as remote in the near term. It is unlikely that Arab nations will agree to forgo chemical weapons while Israel maintains a nuclear arsenal, and it is unlikely that Israel will yield its weapons or weapon capabilities any time in the foreseeable future.

With the breakup of the Soviet Union, chemical-weapon proliferation becomes a problem primarily of regional concerns for the United States and may also be dealt with as a part of a policy to halt the growth and proliferation of ballistic missiles. U.S. declared policy will be to support the CWC, but how much it would expend politically to ensure the CWCs effective implementation is uncertain. The United States has to be concerned that too aggressive a position on the CWC would detract from achieving its objectives in halting nuclear and missile proliferation. Success in constraining ballistic missiles will also reduce the utility of chemical weapons as a strategic weapon.

What more might be done to halt the proliferation of chemical weapons; specifically, what more might the United States wish to do? What feasible options are available that will assist U.S. chemical-weapon nonproliferation policy? Future policy options for inhibiting new chemical-weapon proliferation could be categorized into four approaches:

1. Deny the means of producing chemical weapons, normally through the export control of relevant chemicals, technologies, and technical know-how by supplier nations, with stiff penalties for those that violate the controls.
2. Deter chemical-weapon production and storage by diplomatic agreement, or treaty, with (or without) cooperative, routine, and challenge inspections of chemical facilities and suspect sites and with the rapid destruction of existing chemical-weapon stocks, agents, and production facilities.
3. Deny the utility and effectiveness of chemical weapons by employing active and passive defense measures.
4. Deter chemical-weapon use by threat of retaliation, including sanctions against countries using chemical weapons.

These approaches can be implemented on a bilateral basis between adjoining countries, regionally, or globally. Approaches 1 and 2 seek to deal with chemical-weapon production and storage, and 3 and 4 deal with chemical-weapon use. As important as these approaches may be, the need to remove the underlying political incentives and tensions that cause nations to acquire

chemical weapons remains. The question of removing incentives is a regional and country-specific question, which will not be dealt with here.

Deny Chemical Weapons Through Export Controls

Since 1984, the U.S. Department of Commerce has been adding to its list of chemicals requiring a validated license for export to countries suspected of producing chemical weapons. The Commerce Department has also recently invoked requirements for a validated license to export technical know-how, i.e., the supplying of technical assistance in the construction or operation of chemical production plants, to countries suspected of seeking a chemical-weapon capability. Additionally, the United States has been coordinating its export control policies with the Australia Group. There are, however, several difficulties that have in the past limited the effectiveness of export controls on chemicals and technologies used for producing chemical weapons.

The manufacture of many toxic chemicals, such as the blistering agent, mustard gas, is well understood and literally a textbook process. There are several ways to produce mustard gas, starting with different sets of precursor chemicals, many of which are used for a wide variety of industrial applications and are produced worldwide by the many thousands of tons. Moreover, pilot-plant equipment needed to produce militarily significant quantities of mustard gas, a few hundred tons per year, can be purchased as used equipment throughout much of the industrial and semi-industrial world without an export license.⁴

Secondly, the effectiveness of export controls is as good as the weakest link among participating supplier nations. Prior to the Persian Gulf war, some 50 companies in five Western countries and India allegedly sold precursor chemicals and an assortment of technology to Iraq in support of its chemical-weapon program. Six of these companies were located in the United States. All of the Western countries had export control laws that were apparently circumvented to some degree, including by those companies in the United States.⁵ No doubt improvements to the enforcement of export controls, such as

⁴To date, some of the known proliferators of chemical weapons, Iraq, Iran, Syria, and Libya, have all constructed facilities to produce chemical-weapon agents with the assistance of firms from the industrial nations. One can only conjecture how other suspected third-world nations have gone about producing chemical-weapon agents. This assessment was based on data accumulated throughout the course of this research.

⁵Of the five western countries, however, Germany appears to have been the worst offender. The German government had been warned by the U.S. government, but the warnings apparently went unheeded. A subsequent investigation by the German authorities led to the indictment of some 38 individuals.

sanctions and stiff penalties on companies who violate these controls, could and may be introduced. It will remain uncertain, however, whether the costs of these improvements are acceptable to the governments or industry that would be required to pay for them.

More-lethal chemical agents may be more difficult to produce, requiring more-elaborate safety equipment and precursor chemicals that are much less available. The utility of export controls, therefore, would be to slow the process of producing the more-lethal chemical agents and to increase their cost. Costs, however, will not be a major determinant in a country's decision to pursue a chemical-weapon force. Increased prices for scarce precursors may contribute to the prosperity of the exporters and the porosity of the export control barriers.

Three years after the CWC is in force, a ban on the transfer of many precursor chemicals from member to nonmember states will take affect. Transfers of precursors between member countries will not be restrained. Nonmember countries denied an export license for a desired precursor chemical could set up a dummy corporation in a third member country and, in theory, change the name of the chemical and transship from that country.⁶ The United States alone, however, does require an importing country to obtain a reexport license to ship U.S.-produced precursor chemicals that are controlled to another country for legitimate uses. What the relationship will be between the CWC, an international treaty to which the United States is party, and U.S. export control regulations and which will take precedence are interesting issues.

One must conclude that export controls as currently implemented, or conceived under the CWC, may not deny a determined nation the acquisition of a militarily significant chemical-weapon force over time, i.e. a few hundred tons or more of agent. On the other hand, without the CWC and export controls on precursor chemicals, relevant technologies, and know-how, countries could readily and rapidly set up an overt capability to produce thousands of tons of very lethal and sophisticated chemical weapons. It is uncertain whether additional export controls would further inhibit countries from acquiring chemical weapons or would simply increase the cost of the controls.

⁶Sales and purchases of many industrial chemicals are often between international brokers who resell smaller quantities of these chemicals to manufacturers.

Deter Through Diplomatic Agreements and Treaties

Attempts to deter the use of chemical weapons through treaty and diplomatic means have been made in the past. The Geneva Protocol of 1925 prohibited the use in war of asphyxiating, poisonous, or other gases, and biological warfare, but not the production and storage of chemical weapons, nor did the protocol include a mechanism to determine whether chemical weapons were actually used by one country against another. Italy, a signatory of the protocol, nonetheless used chemical weapons in its war on Ethiopia, also a signatory, during the latter half of the 1930s.⁷ Japan used chemical weapons against China, a signatory, during World War II.

There appears to be some ambiguity as to whether the Geneva Protocol applies to nonparty states. Egypt, a party to the Geneva Protocol, allegedly used chemical weapons in its war with Yemen, a nonparty state, in the 1960s. Allegations of chemical-weapon use in Afghanistan, a nonparty state, have been made against the former Soviet Union, a party to the Geneva Protocol. Further allegations of chemical-weapon use have been made against the governments of Vietnam and Ethiopia. The most extensive violation of the Geneva Protocol in recent times, however, was the use of chemical weapons by Iraq, a party to the protocol, in its war with Iran, also a party, during the mid 1980s. Iraq also killed several thousand of its own Kurdish population with chemical weapons in 1987 and 1988. The protocol appears ambiguous on this matter as well, although other international accords may apply.

To overcome at least some the deficiencies of the Geneva Protocol, the UN Committee for Disarmament concluded a CWC that bans the use, production, and storage of chemical weapons and chemical-weapon agents, permits both routine and challenge inspections of known chemical production facilities and other suspect sites to verify that nations are complying with the convention, and establishes a basis for transferring precursor chemicals for legitimate industrial uses among signatories. While the CWC bans the use of chemical weapons by member states, it is silent on what that precisely means, and it remains to be seen whether some nations will seek exceptions to the use ban.

Although the CWC is expected to enter into force later this year, unsettled issues and differences remain among the negotiating principals. There has been contention about the degree and intrusiveness of on-site inspections needed to verify compliance with the CWC. The convention does not insist that CWC

⁷C. E. Block and E. C. Helmreich, *Twentieth Century Europe*, A. A. Knopf, New York, 1952.

inspectors be allowed entry into a suspect site, one believed to be in violation. It allows the inspected party several days to prepare a suspect site before an inspection external to the facility is allowed, but does require the inspected party to satisfy the inspection team by nonintrusive means that the suspect facility is not in violation of the CWC.⁸ Without intrusive inspections, verifying compliance of suspect sites may be deemed inadequate. Intrusive inspection may raise the risk of detection of illegal chemical weapons at a suspect site, but not the chances of finding a suspect site. The difficulty of verifying compliance is emphasized by the fact that 50 to 100 tons of chemical weapons are considered to be militarily significant among smaller nations, and that one good-size rail tank car, or about five tanker trucks, could hold about 50 tons of chemical-weapon agent.⁹

The convention will also limit the size of the chemical facilities it will routinely inspect to those with over 100 tons of production capacity. This was done to constrain the cost of inspections under the CWC.¹⁰ An inspection of a facility with lesser capacity than the limit would have to be a challenge inspection.

Over 140 nations have endorsed approval of the CWC in the UN General Assembly, but the CWC will not enter into force until the 65th country ratifies it.¹¹ Once the CWC has entered into force, a conference of the state parties will convene to formally set up the political and technical organization to administer the convention. Who will ratify the CWC and how much time this will take is difficult to predict, but it will likely take a few more years for the CWC to become operational.

⁸Amy E. Smithson, "Tottering Toward a Treaty," *The Bulletin of the Atomic Scientists*, July/August, 1992. This article also points out the concern expressed by third-world countries for the CWC requirement to inspect plants that produce Category III precursor chemicals. Category III precursor chemicals are defined as those produced in large commercial quantities that could also be used for chemical-weapon purposes.

⁹Militarily significant quantities of chemical weapons are difficult to define and will differ depending on their use. For effective battlefield use, hundreds to thousands of tons of chemical weapons may be needed, depending on the lethality of the agent employed, the means of delivery, the chemical-weapon defenses for the troops, and the size and duration of the battle. For strategic purposes, tens to hundreds of tons of chemical weapons can be militarily significant against large military bases, including airfields and supply depots, and particularly against cities and ports, where chemical-weapon defenses for populations are difficult to implement. Again, this depends on the virulence of the agent used and the duration of the conflict. For an unclassified discussion of militarily significant quantities of chemical weapons, see M. F. Mullin, K. E. Apt, and W. D. Stanbro, *Criteria for Monitoring a Chemical Treaty: Implications for the Verification Regime*, Report #13, CNSS Los Alamos National Laboratory, December 1991.

¹⁰Cost estimates for on-site inspections to verify the CWC will depend on the number and type of annual inspections, but IDA has estimated them to be between about \$700 million and \$1,500 million over a 15-year period. These costs do not include the cost of maintaining the new UN institutions established to implement the CWC. See Grotte, Leibbrant, and Shultz, *Inspection Costs for a Multinational Chemical Weapons Convention*, IDA Paper P-2383, June 1990.

¹¹*Arms Control Reporter*, May 1992, pp. 704.A.4 and 704.A.5.

The importance of having the CWC in force is twofold. First, the CWC establishes a legal basis for those nations that ratify it to control chemical and technology exports to countries that have not ratified it. The CWC also holds the limited promise of deterring illicit chemical-weapon production in member states through a broad inspection regime supported by information and intelligence data supplied by member states.

Countries who feel threatened militarily by their neighbors, or who feel their industries are at risk, may not be inclined to sign and ratify the CWC any time soon. For those countries, there may be, however, a way to achieve, near term, some of the benefits of the CWC without some of its constraints and intrusiveness: to conclude regional accords that ban the production and storage of chemical weapons.¹² One such accord to eliminate weapons of mass destruction was signed in December 1991 by five Andean countries: Bolivia, Columbia, Ecuador, Peru, and Venezuela. Another is the Mendoza Accord, of 1991, among Brazil, Argentina, and Chile. Both these accords will be superseded by the CWC when these countries sign and the CWC enters into force. It may be that regional accords will be more acceptable when the individual nations feel their specific political and economic interests are being considered in a particular accord.

Regions where it may be possible to reach accords on the banning of chemical weapons (and possibly all weapons of mass destruction) include Central America, most of Europe, parts of east Asia, and the republics of the former Soviet Union.¹³ The potential and immediate gains from regional accords will be the agreement not only to avoid chemical weapons but also to deny support to other nations in their pursuit of chemical weapons, particularly until all aspects of the CWC are in effect and operating. These regional accords could in some instances assist countries toward signing the CWC, the accord being a half-way step, and stimulating domestic political support for a chemical-weapon ban. The potential downside is that, if sufficient countries sign regional accords, it could inhibit their interest in a global accord. The CWC reporting and inspection requirements in chemical manufacturing facilities, which are extremely competitive, will be seen as risking the loss of proprietary data. Not all countries

¹²The general idea of seeking regional chemical-weapon accords has also been considered in Ken Apt, *Verification of the Chemical Weapons Convention: Maximizing Technical Effectiveness*, Vol. 3, CNSS, Los Alamos National Laboratory, April 24, 1992.

¹³Although President Yeltsin declared early in 1992 that all chemical-weapon stocks of the former USSR are on Russian soil, the enormity of former USSR chemical-weapon stocks, over 40,000 tons admitted, and the diversity of their production and storage facilities throughout the former USSR suggest the prudence of such a regional accord as early as possible, in light of the growing tensions among the independent republics and ethnic groups. All the former Soviet republics have, however, sponsored the CWC resolution within the General Assembly.

may be convinced that their potential losses from CWC inspections are worth the uncertain gains of a treaty that they may judge is unverifiable. It would be useful for the United States to discuss the possibilities for more immediate regional accords with other industrial nations as well as with nations in the regions named above.

Deny the Utility of Chemical Weapons Through Defensive Measures

The draft CWC text contains language on assistance to countries that are either threatened or under chemical-weapon attack. The objective of this measure is to encourage countries not to withdraw from the CWC if attacked or threatened with chemical weapons. The thrusts of that assistance are measures to detect a chemical-weapon attack, protective and decontamination equipment, medical antidotes and treatments, and advice on these measures. Countries party to the CWC are encouraged to build their own protective measures and to share information and protective equipment with other members. Passive defenses for large civilian populations will consist primarily of protective equipment: gas masks, decontamination equipment, and medical antidotes. Military forces may also have protective clothing.

The success of these measures will ultimately depend on whether there is enough warning of a chemical-weapon attack for the populace to don gas masks and seek shelter. Without adequate warning and response, a chemical-weapon attack against densely populated cities can be devastating. It can be equally so against unprotected military forces, as was demonstrated by Iraq in its war with Iran. Attacks on cities can be with aircraft or missiles, and battlefield attacks can also include artillery and rockets.

An interesting issue is whether the introduction of active defenses would deter aircraft and missile attacks, thus encouraging countries not to withdraw from the CWC if threatened by a chemical-weapon attack. That is, would the introduction of active defenses escalate the cost of using chemical weapons to the attacker and thereby deter their use, or would the offense-defense cost ratio clearly favor the attacker, making active defenses too costly? Land-based missile defenses surely will be more expensive than short-range missiles with chemical warheads (under 1,000 km) and less than certain to destroy all attacking chemical-weapon warheads. On the other hand, if the potential damage to cities and their

populations is unacceptable, countries may be driven to acquiring active defenses irrespective of cost.¹⁴

In most situations, passive defensive measures are likely to be less expensive than most active measures and, therefore, will be implemented by countries that feel threatened by a chemical-weapon attack. Whether countries will see active measures as useful and affordable remains to be seen, but the question can be raised as to whether the deployment of a retaliatory chemical-weapon force is less costly and a more effective deterrent. Moreover, it would appear that a country that aggressively pursues active and passive chemical-weapon defenses may be in a better position to threaten chemical-weapon use. Therefore, in some instances, active defenses could conceivably add to regional instability and lead to an upwardly spiraling arms race.

The United States has exported its latest Patriot defense system to Israel and has deployed Patriot units in Kuwait and Saudi Arabia. Advanced U.S. theater missile and air defenses will be available later in this decade. Decisions to sell or deploy these defenses will be country specific and will be based on balancing overall U.S. interests. These deployments will be costly, less than perfect as a defense, and could, in some instances, lead to unstable military balances within a region.

Deter Through Threat of Retaliation: Sanctions

This section discusses the possibilities for deterring the use of chemical weapons through the threat of retaliation. Retaliation can take many forms, but the objective is to make the potential user of chemical weapons understand the political, economic, or military price for doing so, or by extension the price to supporters of chemical-weapon use by others. The threat of retaliation could also deter governments from supporting the use of chemical weapons by surrogate groups.

The U.S. Congress has enacted legislation to impose trade sanctions on companies and countries that violate U.S. export control regulations and that knowingly support countries using or seeking chemical-weapon capabilities in violation of international law.¹⁵ Congressionally imposed sanctions would ban

¹⁴Such may be the situation with Israel, which is acquiring Patriot defenses against existing and modified Soviet Scud missiles and is pursuing the development of a more-advanced defense interceptor to defend against future and more-advanced missile threats.

¹⁵For a description and evaluation of these sanctions, see "On the Hill," column, *Export Control News*, Vol. 5, No. 11, November 26, 1991, p. 14, and Vol. 5, No. 12, December 18, 1991, p. 14.

imports into the United States from companies or countries found to have supported chemical-weapon programs abroad. There are obvious problems with these congressional endeavors. The Geneva Protocol of 1925 did not ban the possession of chemical weapons, only their use, and the CWC does not call for trade sanctions. Thus, there is no international treaty basis to support this U.S. position.¹⁶ Second, unless other industrial countries follow suit, the effectiveness of U.S. sanctions is likely to be limited to companies and countries that rely on U.S. markets extensively. If others are to be persuaded to follow suit, however, this unilateral move toward sanctions by the United States is probably necessary to stimulate other countries to proceed along this path.

That there may be a desire to have some form of sanctions as a deterrent to nations' manufacturing chemical weapons and agents is reflected in the UN Commission on Disarmament deliberations on the CWC. Sanctions under discussion for imposition on member countries range from those for minor technical violations of the CWC to more serious ones. These potential CWC sanctions were primarily geared toward limiting the rights and privileges of offending members and would be imposed within the limited powers of the CWC implementing agency. A member nation's rights relate to its participation in the activities of the CWC implementing agency. There are differences among nations involved in the CWC negotiations over the desirability and nature of sanctions. Some believe nonparties should also be sanctioned if they violate the CWC. Others argue that nations cannot be sanctioned for violating obligations they have not undertaken. Basically, the CWC leaves the task of implementing significant sanctions to the UN Security Council when there is a major breach of the CWC that is a threat to international peace and security.

If the UN Security Council were to impose sanctions after the CWC were in force, what sort of sanctions would they be? What would constitute a threat to the international peace and security? Would nonmembers of the CWC who used chemical weapons be sanctioned or punished in the same way as members, or would their actions be ignored? Given that tens of thousands of tons of chemical weapons are believed buried in unidentified locations throughout the world,¹⁷ it is likely that some countries will continue to be technically in violation of the CWC, possibly for decades to come. It may be difficult, therefore, for the UN Security Council to impose any serious sanctions without first determining

¹⁶Proposals have been made for the Geneva Protocol of 1925 to include sanctions to be administered by the United Nations against countries violating the convention.

¹⁷For a listing of existing and suspected chemical-weapon stockpiles, elimination of chemical weapons in the past, and possible caches still existing or that have been buried since World War II, see *Arms Control Reporter*, May 1992, pp. 704.E.0.1-704.E.0.18.

whether there was a clear intent to possess chemical weapons and to circumvent the CWC. In theory, nations that have some chemical weapons could bury them before joining the CWC and claim they were lost if uncovered later. Chemical-weapon stocks buried prior to 1975 may not have to be accounted for under the CWC. Thus, the deterrent value of sanctions imposed on a country for simply having chemical-weapon is uncertain, particularly if the nation in violation feels threatened by a militarily larger or stronger enemy. Moreover, many precursor chemicals have important industrial applications, allowing a country to purchase and store enough precursors to produce militarily significant quantities of chemical weapons in a short time.

The objective of UN sanctions should be to deter the use of chemical weapons during conflicts between nations, thus possibly reducing the incentive for nations to acquire chemical weapons as well. Nations may still acquire chemical weapons clandestinely, but the cost of using chemical weapons should be seen as too high. This of course implies that the threat and degree of UN sanctions be understood by nations contemplating the use of chemical weapons. Moreover, UN sanctions can, in principle, be levied against an offending nation whether or not it has signed or ratified the Geneva Protocol or the CWC. It is conceivable that, if the United Nations were to pass a resolution spelling out in general terms the consequences of chemical-weapon use by its members, more nations might ratify the CWC more quickly.

What might be an effective deterrent, and possibly more stabilizing, is the prospect that UN sanctions would be imposed with high certainty against countries that are proven to have used chemical weapons in wars or against civilian populations. As an example, the Security Council could pass a resolution now stating that, in the future, nations proven to have used chemical weapons (specifically defined agents) will, with a two-thirds vote of the Security Council, be subject to sanctions. The degree of sanctions should be generally known beforehand and could be established more specifically by the Security Council as a function of the level of violence undertaken by the offending nation and other relevant factors. Sanctions could be political, economic, or military, or some combination. Sanctions could approximate in severity (but not in kind) those imposed on Libya, which bar all international air transportation to and from Libya until it agrees to extradite two security agents implicated in the Pan Am 103 bombing in 1989. A similar ban could be imposed on a country until it paid reparations levied on it by the UN to civilian victims of its chemical-weapon attack and destroyed all its chemical weapons under UN supervision. If a nation refused to meet the requirements for lifting the imposed sanctions within a

prescribed period of time, the UN Security Council could place additional political or economic sanctions on that nation.

Alternatively, sanctions on countries found by the UN to have employed chemical weapons could approximate those imposed on Iraq after Desert Storm. Such drastic sanctions could be the result of chemical-weapon attacks against civilians, including domestic populations, causing hundreds or thousands of casualties. The sanctions may also differ for a country that uses chemical weapons in self defense, having been attacked by overwhelming military forces and with a population being ravished by conventional military means, to halt the slaughter of its own people. This should not necessarily be the basis for avoiding sanctions, but the existence of such differences could stimulate the Security Council to take steps to halt conflicts that could escalate to the use of chemical weapons or other weapons of mass destruction. Indeed, to the extent that the UN proscribes the use of chemical weapons to deter attacks, conventional or otherwise, it would appear to share in the responsibility of helping to deter conventional attacks by aggressive nations.

UN sanctions against Iraq after Iraq invaded Kuwait, and subsequently against Libya and Serbia, have enhanced the UN Security Council's image both as a body and for cooperative action among members. Therefore, a UN resolution defining sanctions to be imposed on a country using chemical weapons could be a useful deterrent and could ease the requirement on how much might have to be accomplished by the CWC or its need to verify compliance. It is possible that UN specification of sanctions for chemical-weapon use could lessen the need for an inspection regime as intrusive as some nations demand. The inherent trade-off is that countries assured that punishing sanctions will be imposed on chemical-weapon users may be less ardent in their demands for intrusive inspections of suspect sites. Passing a resolution for sanctions based on chemical-weapon use will require the UN to have a mechanism for establishing whether chemical weapons were actually used in a war or against civilians. This could be the responsibility of the inspection agency to be created by the CWC or of the ad hoc UN group used to inspect Iraqi chemical-weapon facilities, until a CWC agency becomes operational.

Nations normally shy away from prescribed policies, preferring the flexibility to deal diplomatically with international issues as they occur, on a case-by-case basis according to national self-interests. In principle, UN sanctions for chemical-weapon use can also be imposed on countries that are not parties to the CWC by insisting that UN members support the sanctions. While the UN Security Council is capable of invoking sanctions against a country without a preliminary resolution, a resolution stating the nature of the sanctions to be imposed for

using chemical weapons would be less ambiguous to the potential chemical-weapon user, as well as to the members of the Security Council themselves.

Whether newly industrializing countries would support a UN resolution declaring sanctions against another industrialized country for proven chemical-weapon use is uncertain. They may believe that such potential sanctions are intrinsically unfair and would more likely be invoked against them than against some larger, richer, or more powerful industrial country. It would be hard to imagine the imposition of sanctions on Germany or Russia.¹⁸ Neither is likely to be attacked by superior forces, and both are too important economically in their respective regions for their neighbors to respect sanctions necessarily.

There is no simple way to codify sanctions against the use of chemical weapons or the support of others' use of chemical weapons. If a series of sanctions were to be imposed on a country found to have illegally employed chemical weapons, numerous factors would have to be considered. First, it would be important to ensure that the accused party had actually used chemical weapons. Second, it would be important to ascertain the extent of chemical-weapon use, the casualties caused, and whether chemical weapons were employed against civilian populations directly or whether civilian casualties were incidental to a military attack. It would be important to understand whether chemical weapons were used preemptively or in response to an opponent's use, and whether they were used on the territory of the attacker or the defender, assuming they can be distinguished. The appropriate sanctions would be selected in response to the details of chemical-weapon use.

If only a few tens of casualties were incurred from a chemical-weapon attack, the sanctions could be limited to reparations paid to the victims or their families, UN censure, and the elimination of all chemical weapons and chemical-weapon-related equipment and facilities under UN supervision. A time limit for conclusion of these actions would be imposed. If the actions were not completed by that time, the UN Security Council could elect to impose more stringent sanctions, such as a halt of all military sales to the offending country, a ban on international transportation to and from that country, a call for a reduction in diplomatic relations with UN member nations, or some combination of the above.

¹⁸Economic sanctions against Italy for its invasion of Ethiopia in 1935 were approved by the League of Nations, but those failed. See C. E. Block and E. C. Helmreich, *Twentieth Century Europe*, Knopf, 1952, for a more detailed discussion on why sanctions failed.

If hundreds of casualties were caused by chemical weapons, the sanctions could begin with a halt to military sales to the offender; a ban on international transport; a reduction in diplomatic relations, along with the payment of reparations; and the destruction of all chemical-weapon stocks, machinery, and facilities. If the chemical-weapon casualties are in the thousands, then, along with what has been described above, sanctions could also include some degree of UN military intervention against the chemical-weapon user, a major economic embargo—except for food and medicines—and, possibly, a call for the removal of the government in power. Again, if the government of the offending nation were not to comply, the UN could escalate its sanctions and call for the trial of the government leaders as war criminals.

It is not possible, a priori, to be more precise as to what and how sanctions might be imposed. There will always be extenuating circumstances that need to be considered in the imposition of sanctions. If a country used chemical weapons on its own territory and only inflicted small numbers of casualties on an invading enemy's military forces, the UN Security Council might moderate its sanctions accordingly, either in scope or intensity. If an invading military force were to use chemical weapons against civilian population centers, UN sanctions could be extreme, mirroring the military, political, and economic sanctions levied against Iraq in Desert Storm and afterward. As a political matter, there would have to be some flexibility for the UN Security Council to respond. Narrowly codifying sanctions would be impractical and could lead to their being ignored.

An important question is whether the UN Security Council could impose sanctions on a country proven to have employed chemical weapons that was not a member state of the Geneva Protocol or the CWC, both of which ban the use of chemical weapons. In fact, there are several international treaties and accords, including the UN founding charter, that would allow the UN to act against an errant nation.

Another important question is whether the veto of the permanent members of the UN Security Council should be set aside when voting on the imposition of sanctions. The CWC implementing agency would also require a two-thirds vote to bring its findings of chemical-weapon use to the UN Security Council for further action. The permanent members of the UN Security Council have not used their veto in the last two years, but they may consider that any agreement to set aside their veto in voting for sanctions of this kind would be an undesirable precedent. It is hard to imagine that, if irrefutable proof of chemical-weapon use is presented, especially if employed against civilians, any permanent UN Security Council member would not support the imposition of some form of

sanctions. Giving up the veto may not be essential, therefore, to ensuring the imposition of sanctions where appropriate.

The United States and other like-minded nations must now prepare a resolution, for the UN General Assembly to approve and the UN Security Council to adopt, that will give the type and range of sanctions—political, military, and economic—that the UN Security Council will impose on chemical-weapon offenders. The correspondence between the magnitude of casualties, or economic damage, inflicted by the use of chemical weapons and the precise sanctions that may be imposed should be left somewhat vague. What should not be left vague is the UN Security Council's intention and will to impose sanctions when necessary.

The UN Security Council must also consider, certainly in serious instances of chemical-weapon use, the need to ensure that its members adhere to the sanctions imposed on a violating state. Thus, it may also be necessary to consider how states that knowingly circumvent UN-imposed sanctions against Iraq have been kept in line. While not perfect, economic sanctions against Iraq have been kept generally intact by UN and U.S. pressures on nations surrounding Iraq.

UN sanctions would be meant to deter the use of chemical weapons and, by extension, the desire to acquire them. Sanctions against use will not necessarily inhibit the production and storage of chemical weapons, nor will sanctions necessarily halt the use of chemical weapons by terrorists and subnational groups, but it could make governments more wary of supporting chemical-weapon use by such groups. Thus, UN sanctions should properly be seen as additional constraints on the proliferation and use of chemical weapons. Moreover, such sanctions have the potential of being raised, debated, and passed by the UN Security Council in a matter of weeks. Export controls, implementing the CWC, or deploying active defenses all incur economic costs. A UN resolution calling for sanctions against countries that use chemical weapons can help avoid that expense.

5. Conclusions

The 1990s came in on a wave of monumental political change: the peaceful change from communist to democratic governments in eastern Europe, from a divided to a unified democratic Germany, and the crumbling of the Soviet Union into more than a dozen independent republics that are to varying extents democratic. The East-West competition is over. These fundamental changes led to policy changes in other countries, particularly in the West, which in turn led to such actions as Iraq's invasion of Kuwait and Iraq's threat to use chemical weapons against UN forces and Israel.

That event galvanized the United Nations as never before. Between August 1990 and April 1991, the UN Security Council adopted 15 resolutions relating to Iraq's invasion of Kuwait, 7 unanimously and the remainder by vast majority. The Security Council, which has not had a veto invoked by its permanent members in two years, also demonstrated its resolve by imposing sanctions on Libya until it extradites two individuals from its security force accused of participating in the bombing of Pan Am 103 over Lockerbie, Scotland in 1989, which killed 270 people. Economic sanctions have also been imposed on Serbia for its role in support of Serbian forces dismembering Bosnia-Herzegovina. Whether the UN can maintain that resolve is an important question.¹ If the UN can effectively enforce already-imposed sanctions, deterring chemical-weapon use by threat of sanctions may be possible. The UN must not only have the resolve to impose fitting sanctions against countries that have used chemical weapons, but its members must have the resolve to maintain effective sanctions, even when those sanctions pinch the member countries economically or politically.

As demonstrated by the sanctions invoked against Iraq, sanctions can be effective, although they may have a half-life of about a year or so. Iraq's borders are fairly porous, and some violations are overlooked primarily because the sanctions imposed on Iraq are severely felt by Iraq's innocent neighbors. Nonetheless, countries assessing the situation in the Gulf must conclude (1) that the UN has awakened and may become an effective international political body; (2) that the major powers of the world will employ that body to intervene,

¹The UN is currently undertaking a contentious debate on its peacekeeping role in the post-Cold War era, including the allocations of armed forces by Security Council member nations. See Paul Lewis, "U.N. Set to Debate Peacekeeping Role," *New York Times International*, September 6, 1992 for a more complete discussion of the proposals being considered.

militarily if necessary, when their interests or the international peace is threatened; and (3) that the severity of the military intervention against Iraq was related to a significant extent to the desire of the UN coalition to eliminate Iraq's capacity to produce and use weapons of mass destruction.

What is understood in the aftermath of Desert Storm is that it remains uncertain whether UN inspectors have located all of Iraq's chemical weapons, and that the know-how in Iraq to produce chemical weapons will allow it to do so in relatively short order once UN sanctions are lifted and the inspection teams leave. It must be anticipated that, in time, Iraq will once again reestablish its chemical-weapon capability, perhaps clandestinely, to maintain its military balance against its archenemy Iran or to seek hegemony again in the Gulf region.

It would appear there is no single method for halting the proliferation of chemical weapons. Export controls on precursor chemicals, chemical plant technology, and know-how will tend to increase the cost to some countries of acquiring the more-sophisticated chemical agents. The ubiquitous nature of the precursor chemicals for the older forms of chemical weapons makes their elimination very difficult. Adherence to the CWC even with an extensive inspection regime may not be verifiable, but it will give weight to making the existence of chemical weapons illegal. It is uncertain, however, how long it will take for the CWC to enter into force and become operational.

It would appear that an announcement of UN sanctions that will be invoked on countries employing chemical weapons could diffuse concern for some of the more difficult inspection and verification problems with the CWC. If, however, no such UN sanctions are announced,² there may be virtue in completing less-stringent regional accords banning chemical weapons as quickly as possible. This would at least allow many regional players a legal basis for eschewing chemical weapons. For these countries, such regional accords could act as placeholders until the CWC was in force and operational.

When all is said and done, the attempt to halt chemical-weapon proliferation could still fail, since chemical weapons may be more of an effect than a cause. Countries facing stronger and larger enemies may continue to perceive a need for chemical weapons in spite of efforts to the contrary. Moreover, the introduction of chemical weapons as a deterrent to aggression might in some instances be stabilizing. To the extent that chemical weapons could be a stabilizing measure

²The Peoples Republic of China, a permanent member of the UN Security Council, may invoke its veto of any such broad resolution. It is likely that the European Community and other industrial democracies would support such a resolution, however. See Paul Lewis, *New York Times International*, September 6, 1992, p. 4.

in some regional context, it would be incumbent on the world community, namely the UN, to take steps to ensure that regional stability is maintained if chemical weapons are eliminated in that region either by the threat of sanctions or, indeed, by armed intervention.

It is uncertain how threatening chemical-weapon proliferation is to U.S. interests. With the exception of chemical-weapon use by terrorist groups, it appears unlikely that any nation would risk a massive conventional retaliation by the United States with a chemical-weapon attack against U.S. forces. But it is this same military might standing behind UN sanctions that may similarly deter any nation from employing chemical weapons against another nation or its own people. Indeed, some countries may already be deterred from developing chemical weapons because of the UN response to Iraq's program during Desert Storm. There may, however, be little the United States and the rest of the industrial world can do physically and conclusively to halt the determined proliferation of chemical weapons by others, but it can, in conjunction with the UN, advertise the price a country would surely pay if it chose to use chemical weapons.